STATUS OF RONGELAP INVERTEBRATE STUDIES, OCTOBER 26, 1960

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Three phases of endeavor may be mentioned.

1. Facilities of the Research Computer Laboratory were utilized for writing a program, with the aid of Dr. E. E. Collias, oceanographer, to permit data processing of gross beta using the IBM 650 computer. Two subroutines, prepared with the help of Dr. D. B. Dekker (Director, Computer Lab.) compute, (a) the geometric mean plus and minus one standard deviation, and, (b) the coefficient of variation for a selected group of values.

Since the first program yields the results in six types of units, d/m/g and μc/kg, wet, dry, and ash (as well as the counting error at the 95% confidence level and the three possible weight ratios), the two subroutines may be used to select the unit that gives the least variability. In this way the unit may be used that is appropriate to the nature of the sample. For example, less variability resulted when radioactivity of plankton was expressed on an ash-, than on a wet-weight basis.

2. Gross beta radioactivity of invertebrates of Rongelap waters in Sept. 1959 is summarized in the accompanying table. The highest levels are in the northwestern portion of the atoll (Naen I.) where clam kidney was 1 microcurie per kilogram of wet tissue. Samples showing most radioactivity were hermit crab exoskeleton, snail liver, and kidney of tridacnid clams.

Through the courtesy of Dr. Douglas G. Chapman, statistician, it was shown that in our data no significant difference existed between the tissue values of radioactivity for different species of tridacnid clams at any particular locality, and, similarly, that values for the sea cucumbers <u>Holothuria</u> <u>atra</u> and <u>H.</u> <u>leucospilota</u> did not differ significantly. Therefore, levels of radioactivity for tridacnid clams may be calculated on the basis of whichever species is available at that particular locality, and either or both of the common black sea cucumbers may serve as a monitoring species.

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3. In a special study during the September 1959 expedition, the abundance of black sea cucumbers on several of the more important islets was evaluated in notes supplemented with photographs taken of representative portions of the beach at low tide while walking around the shore of the islet. Sea cucumbers are of particular importance in turning over bottom sediments.

The results of this study have yet to be compiled, but may be expected to contribute to the ecological picture and to the knowledge of the biology of these sea cucumbers. One specimen of Holothuria atra was observed in the process of transverse fission. A specimen of Stichopus chloronotus harboring internally a commensal fierasferoid fish was reported in "Copeia", Sept. 1960:255.

4. (The principal isotopes found in the marine invertebrates are Zn^{65}, Co^{60}, Co^{57}, Mn^{54}, Ce^{144}).

Levels of gross beta radioactivity of invertebrates at Rongelap Atoll in September 1959, arranged by islands clockwise around atoll starting at the northwest region; data grouped by type of organism and tissue. Geometric mean ($\bar{x}$) and standard deviation (s) were computed using logarithms.

Island	Organism	Tissue	Millimicrocuries per kilogram, wet			Number of plates
			$\bar{x}$	$\bar{x}$-s	$\bar{x}$+s	
Naen	sponge	entire	30	-	-	1
Naen	clam	muscle	14	10	18	6
Naen	clam	gill	20	10	39	6
Naen	clam	kidney	1000	630	1600	6
Naen	clam	visc. mass	61	35	106	6
Naen	clam	mantle	13	9	19	6
W. Yugui	clam	muscle	17	16	18	2
W. Yugui	clam	gill	15	9	27	2
W. Yugui	clam	kidney	680	670	680	2
W. Yugui	clam	visc. mass	76	46	125	2
W. Yugui	clam	mantle	14	11	20	2
Piganiyaro.	sea cucumb.	integument	19	12	30	4
Piganiyaro.	sea cucumb.	gonad	14	8	25	4
Piganiyaro.	sea cucumb.	gut	54 → 84	46	65	4
Lomuilal	snail	muscle	133	118	149	2
Lomuilal	snail	liver	510	450	580	2
Lomuilal	snail	visc. mass	280	220	360	2
Gejen	sea cucumb.	integument	7	5	11	3
Gejen	sea cucumb.	gonad	11	10	14	3
Gejen	sea cucumb.	gut	39	31	50	3
Island 13	sea cucumb.	integument	28	24	33	2
Island 13	sea cucumb.	gonad	21	16	29	2
Island 13	sea cucumb.	gut	112	92	136	2
Anielap	clam	muscle	5	4	8	4
Anielap	clam	gill	5	5	6	4
Anielap	clam	kidney	240	210	290	4
Anielap	clam	visc. mass	51	20	127	4
Anielap	clam	mantle	6	4	8	4
Kabelle	sea cucumb.	integument	3	1	14	2
Kabelle	sea cucumb.	gonad	20	9	47	2
Kabelle	sea cucumb.	gut	33	20	54	2
Kabelle	hermit crab	muscle	63	-	-	1
Kabelle	hermit crab	liver	67	-	-	1
Kabelle	hermit crab	exoskeleton	1360	-	-	1
Kabelle	snail	muscle	290	190	450	4
Kabelle	snail	liver	490	280	850	4
Kabelle	snail	visc. mass	300	190	480	4
Kabelle	clam	muscle	5	4	8	9
Kabelle	clam	gill	10	6	18	9
Kabelle	clam	kidney	125	62	250	9
Kabelle	clam	visc. mass	48	21	110	9
Kabelle	clam	mantle	6	4	8	9

Table continued

Island	Organism	Tissue	Millimicrocuries per kilogram, wet $\bar{x}$	$\bar{x}-s$	$\bar{x}+s$	Number of plates
Mellu	sea cucumb.	integument	8	4	14	2
Mellu	sea cucumb.	gonad	9	8	11	2
Mellu	sea cucumb.	gut	18	18	18	2
Mellu	snail	muscle	59	48	72	2
Mellu	snail	liver	111	109	113	2
Mellu	snail	visc. mass	108	61	192	2
Eniaetok	sea cucumb.	integument	11	6	20	9
Eniaetok	sea cucumb.	gonad	8	4	16	9
Eniaetok	sea cucumb.	gut	33	19	56	8
Eniaetok	snail	muscle	71	49	104	2
Eniaetok	snail	liver	240	130	450	2
Eniaetok	snail	visc. mass	165	103	260	2
Rongelap	sea cucumb.	integument	7	6	8	5
Rongelap	sea cucumb.	gonad	9	5	16	5
Rongelap	sea cucumb.	gut	17	11	25	5
Rongelap	snail	muscle	22	15	33	3
Rongelap	snail	liver	71	44	114	3
Rongelap	snail	visc. mass	39	30	50	3
Rongelap	clam	muscle	6	5	8	5
Rongelap	clam	gill	7	5	9	5
Rongelap	clam	kidney	142	108	187	5
Rongelap	clam	visc. mass	18	7	42	5
Rongelap	clam	mantle	6	5	8	5
Tufa	sea cucumb.	integument	4	4	5	2
Tufa	sea cucumb.	gonad	8	-	-	1
Tufa	sea cucumb.	gut	21	20	21	2
Burok	sea cucumb.	integument	16	-	-	1
Burok	sea cucumb.	gonad	28	-	-	1
Burok	sea cucumb.	gut	42	-	-	1
Total						261

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